Developing a questionnaire to measure psychological disturbance associated with tooth loss

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DOI:
10.1016/j.jdent.2020.103353

Document Version
Peer reviewed version

Citation for published version (Harvard):
Kudsi, Z, Fenlon, MR, Hill, K & Baysan, A 2020, 'Developing a questionnaire to measure psychological disturbance associated with tooth loss', *Journal of Dentistry*, vol. 98, 103353.
https://doi.org/10.1016/j.jdent.2020.103353

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Introduction

Adult Oral Health in the UK has been gradually improving, and the prevalence of tooth loss has been in decline in the last 30 years. Nevertheless, it is estimated that 6% of the population remain edentulous, a further 14% have experienced significant tooth loss (>11 tooth loss) and "one in every five" adults have removable dentures (either partial or complete).[1] Previous research has shown that tooth loss can have a significant impact on the general and oral health-related quality of life.[2,3] Edentulous or partially dentate patients may require either removable dentures or osseointegrated dental implants to restore their dentition. Dentures could restore function and is a non-invasive treatment option. Whilst some patients cope with and adapt well to tooth loss and dentures; others experience emotional distress as they might have less psychological resilience and ability to adapt to changes.[4] Some authors also reported that tooth loss could cause significant emotional and psychological distress in some patients despite being successful denture wearers.[5] Therefore, it is important to assess the psychological disturbance and wellbeing in those patients.

Screening tools have widely been used for depression, anxiety and distress in patients with various medical conditions, such as amputations, artificial prosthesis replacements, chronic illness, cancer and palliative care.[6,7,8]

Different methods were suggested to develop and test questionnaires that assess outcome measures. The Scientific Advisory Committee of the Medical Outcomes Trust (SAAC) produced a list of eights attributes with quality criteria

to help develop questionnaires and enhance their validity[9]. Firstly, designing a conceptual and measurement model that needs to include: a measurable concept, a defined target population, an established the level of measurement. Secondly, assessing reliability, validity, responsiveness and interpretability. Finally, the burden to use the questionnaire needs to be assessed, i.e. time and efforts for respondents/administrators to use the questionnaire. The SAAC has also recommended additional attributes to be used if alternative methods are implemented when the questionnaire is used (using a computer, an interviewer or using a self-administrated questionnaire).[9] Other researchers also described similar methods to design and validate questionnaires.[10,11,12]

Unfortunately to date, the available tools are neither suitable nor validated to screen and measure psychological distress in adult patients with tooth loss.[13] Therefore, a disease-specific measure is required to investigate the psychological health and wellbeing of people with tooth loss and evaluate outcome measure of the intervention with technically successful removable dentures. The aim of this study was to develop a measure to assess psychological disturbance and wellbeing in patients with tooth loss and dentures.

Study methods

Although there are different strategies to design and validate a questionnaire as outlined in the introduction, all the methods share common consensuses, and were used to develop the questionnaire for this study. There were two consecutive phases as follows:

Phase 1. Development of the questionnaire

- Describing the aims/target population of the questionnaire
- Generating a pool of items, defining the constructs to be measured
- Adapting psychological morbidity screening tools
- Items reduction and producing a preliminary questionnaire

Phase 2. Validation of the questionnaire

- Content validation
- Face validation (participants feedback)
- Establishing Construct Validity
- Pilot test and establishing reliability

Study population

Ethical approval was obtained from the Health Research Authority NHS England, reference 17/NI/0098 (This study was part of a large-scale clinical study that aimed to investigate the psychological disturbance caused by tooth loss). Recruitment of participants to validate the questionnaire was carried out at two Primary Dental Clinics in England.128 participants (100 patients and 28 clinicians) were recruited to participate in the development and validation of the questionnaire. Inclusion criteria included adults (age ≥18) with tooth loss and technically successful dentures (used by participants for ≥ 1 year) and stable dentition (if present), free of primary dental disease (active dental caries/periodontal disease). Exclusion criteria included patients with a history of psychotic mental illness or patients who had treatment with dental implants. Participants were given a patient information sheet (PIS) and signed written consent forms.

Phase 1. Questionnaire development

Defining the aims/target population of the questionnaire:

This proposed questionnaire aimed to assess the impact of tooth loss in patients who had tooth loss and technically good quality dentures. Specifically, the questionnaire aims to assess the psychological health and wellbeing of adults with technically successful dentures.

Generating a pool of items and defining the constructs to be measured:

A pool of items that relate all problems observed or experienced with tooth loss/dentures was produced through focus interviews with participants (n=30), clinician feedback (n=10) and extensive literature review. Each participant was asked to list all problems, difficulties and emotions that they experienced as a result of tooth loss. Ten general dental practitioners (with >10 years experiences) were also asked to describe the problems and difficulties related to patients with tooth loss/dentures. The generated items were assigned to subscales to represent the constructs of the questionnaire.

Psychological morbidity screening tools:

The Depression, Anxiety and Stress Scale (DASS-21)[14] was added to the proposed questionnaire to screen for somatic symptoms of depression, anxiety, and distress. The DASS-21 has been identified in a previous study as a possible suitable questionnaire to investigate the psychological disturbance associated with tooth loss, as the DASS-21 has been extensively researched

for its psychometric properties. [15] Furthermore, the DASS-21 can also identify and differentiate the degree of depression, anxiety and stress. [15]

The Distress Thermometer (DT), which is a visual analogue scale, was adapted from the NCCN,[16] and was also added to the proposed questionnaire. While the DASS-21 measures the general somatic symptoms related to psychological disturbance, the DT measure distress directly "direct patient's self-perceived measure of the impact of tooth loss". Therefore, a two-dimensional measurement is captured by combining the two tools.

Questionnaire Item reduction:

Willis and Artino recommended that a small sample size (n=10-30) of participants is adequate for qualitative analysis;[17] therefore, ten participants were recruited for the task related to questionnaire item reduction. Each participant was asked to review the generated items/problems from phase one, and then report the frequency of each on a five-point Linkert scale. Answers "Never" to "Very Often" were allocated to the numbers "0" to "5" ("Don't Know" answers were excluded). For each item, an importance score was produced by calculating the mean score for each item. The item had a higher importance score if more participants experienced the problems and/or the frequency of the problems was reported more often. The reason to only consider item-importance for the item-reduction task was because this task aimed to identify the items/problems that are most important from the patients' perspectives.

Phase 2. Questionnaire validation:

To assure the integrity of a measurement tool, the psychometrical properties (validity and reliability) of the tool should be confirmed. Validity is defined as the "*ability of the instrument to measure the attributes of the construct under study*" whereas reliability refers to "*the ability of an instrument to measure an attribute consistently"*.[18]

Content validation

Establishing content validity was carried out by recruiting a panel of experts to review the questionnaire items for readability, clarity, validity, comprehensiveness and redundancy.[9] Experts in questionnaire development were selected from the list of researchers identified during the literature review.[12] There is no agreement on the required number of experts needed to assess content validation; i.e. seven or more experts are recommended by many authors.[12,18] Therefore, the aim for this task was to recruit at least 10 experts to assist in validating the questionnaire in this study.

Forty-two potential experts were identified from the literature review. Experts were contacted through emails. 27 experts agreed to participate, and 18 out of 27 experts have returned their feedback within the required time. Eight experts only partially completed the feedback form. Each expert was asked to identify which items are essential for the measuring tool and to provide feedback about the structural design of the measure.

The Lawshe method[19] was used to assess which items were essential. Lawshe indicated that if 50% or more of the experts agreed that an item is essential, then that item had some content validity.

Face validation

Face validation is important as if respondents misinterpret or misunderstood the question (due to poor wording or inadequate response options etc.), then the tool may fail to capture the intended construct, and this may lead to measurement errors.[12] A sample of 20-30 is recommended for face validity.[17] Therefore, 20 participants were recruited for face validation (ten participants for the initial face validation and further ten for the final face validation).

Initial face validation: Ten participants were recruited to evaluate the wording, clarity, and readability of the preliminary items. Participants completed the proposed questionnaire in a quiet room. This was followed by focused interviews to assess items, constructs and layout of the questionnaire. The focus interviews also asked about the suitability of the DASS-21, DT as psychological measures related to tooth loss.

Final face validation: Further ten participants were recruited to test the revised items cognitively. This was carried out by probing the respondent's thoughts processes and determining that participant's understanding and interpretation of each item is accurate. The assessment also included comprehension, recall, judgment and response of items in the questionnaire. Participants answers, feedback, opinion and criticism were recorded.

Construct validity:

Construct validity is defined as "*the extent to which items in a measure relate to the theoretical construct".*[18] Therefore, the items in the proposed questionnaire should be able to measure the concepts that are theoretically and structurally related to the impact of tooth loss.

Many methods exist to assess construct validity of a new measure, including hypothesis testing, testing against a gold standard test and factor analysis.[18] One of the common ways to assess construct validity is to develop and test a hypothesis about the expected relationship between constructs. This could be conducted by hypothesising a theoretical and structural relationship between different but related constructs. If this logical relationship existed, then this proves that the theoretical hypothesis of the new scale, and therefore indicates that the new scale has some degree of construct validity.[9,18] The hypothesis testing method was used to assess construct validity in this study, as there were no gold standards to test against.

To establish construct validity, it was hypothesised that the theoretical framework of the subscales of the body image and the functional difficulties should both correlate strongly (R>0.5) with the global DT scale (as all those three tools assess theoretical characteristic of tooth loss). It was also hypothesised that the functional difficulties domain of Part A would correlate strongly (r>0.5) with OHIP-14 functional limitation, physical pain and psychical disability domains. Furthermore, the body image domain of Part A would correlate strongly (r>0.5) with psychological discomfort and psychological disability and social disability domains. All those subscale measures are different, but related concepts. Therefore, construct validity was supported if the scores reflected the framework as hypothesised. There is no clear

agreement in the current literature regarding the sample size required to test construct validity.[9,12,18,20] Psychometric experts recommend that the minimum sample for constructing factor analysis should be five participants *per* item/construct.[21] However, there is lack of clear agreement for the number needed to test theoretical hypothesis. Therefore, a sample of 20 participants was recruited (based on a minimum of five participants per item/construct) to complete the developed questionnaire and OHIP assessments. Pearson correlation coefficient test was used to measure the correlation between those concepts.

Pilot test and reliability

Pilot testing improves the internal validity of the questionnaire and helps to maximize response and completion rate.[22] The pilot sample for this study was calculated based on 10% of the sample projected for the main study. Therefore, a sample size of 20 participants was recruited. The pilot test aimed to assess the questionnaire clarity/readability and investigate the reliability of the proposed questionnaire (test re-test and internal consistency).

Questionnaire clarity/readability

Each participant from the pilot sample was probed about the clarity of these items, scale adequacy and choices of responses.

Questionnaire internal consistency

Internal consistency assesses whether the items that are measuring a specific domain generate consistent scores.[9] Cronbach's alpha was used to assess internal consistency.[23]

Questionnaire test re-test reliability

Test re-test reliability is confirmed if a measure is stable over time.[9] Test re-test reliability was assessed by administering the questionnaire to the same participants and under the same conditions twice with a specific time interval. Test re-test reliability is established when the same participant produces same or similar scores on repeated testing, i.e. the attributes measured maintain stability over time.[24]

There have been different recommendations for the time interval between the test and the re-test, ranging from few days to few months. Most researchers suggest a timing interval of 2 - 4 weeks.[9,24] As the domains measured in this study were cognitive and emotional, it was decided to use the two weeks intervals, and those attributes were not likely to change in this short period.

Participants filled the questionnaire in a quiet room at the dental practice after signing the consent form. The same questionnaire was completed again by each participant under the same condition two weeks later. The re-testing questionnaire was completed just before the participants were scheduled for the pilot interview appointment. The reason for distributing the re-test questionnaire before the interview appointment was to prevent the interview interactions from influencing the re-test responses. The test re-test reliability was assessed by measuring correlations between scores.

Statistical analyses

Pearson correlation coefficient, Cronbach's α Coefficient and ICC were used to assess the psychometric properties of the questionnaire. Data was analysed using IBM SPSS Statistics (Version 25.0)

Results

Generating a pool of items and defining the constructs to be measured:

The interviews from participants and general dental practitioners generated 167 statements/problems/difficulties. 35 statements remained after removing the duplicate and repetitive statements. The literature review and the examination of all existing tools generated 41 further items. The items/statements that have been generated were analysed, and two distinctive constructs were identified:

First construct: Functional difficulties, including problems speaking and eating (food choices, enjoying eating, discomfort).

Second construct: Dissatisfaction with self-image related to tooth loss/replacement with dentures.

Questionnaire item reduction:

The questionnaire item reduction task resulted in a total of 12 items (based on the highest importance score). Those 12 items and the psychological morbidities tools produced a preliminary questionnaire that has been validated in the next phase.

Content validation:

Experts had different opinions on how to improve the questionnaire. However, one main change that most experts recommended was to remove the double-barrelled items. Items with low content validity were edited (Table 1).

Initial face validation:

80% of participants (n=8) indicated that the language and vocabulary used were appropriate. Furthermore, 60% (n=6) indicated that the questionnaire, in general, was an appropriate tool to explore the impact of tooth loss and any associated psychological disturbance. The DASS-21 was seen as appropriate measures to screen for negative mood, which might be related to tooth loss (depression, anxiety, stress). The initial face validation resulted in changes to items/wording/layout (Table 1).

Final face validation:

Discussion with participants included types of Likert response options to be used in Part A. The two choices included “frequency of problems” and “level of agreement with the statement”. Following discussion with participants, it was decided that frequency scale (very often/often sometimes/rarely/never) was less subjective and more meaningful as participants found it easier to report the frequency of each problem.

Construct validation:

The results indicated that all domains correlated strongly (r>5) as hypothesised except the social disability domain that correlated only mildly (r>5 & <3) with

the body image domain. Nevertheless, this moderate correlation was still accepted that the framework is structured as hypothesized (Table 2).

Questionnaire test re-test reliability:

The correlation coefficients for the functional and the body image domains were 0.86 and 0.79. The Pearson coefficients were 0.93 and 0.94 (significant at 0.01). The items correlation for Part A ranged from 0.7 to 0.9. All scores are indicating adequate reliability for Part A subscales and items. The correlation coefficients for DASS-21 three domains were also >0.7 indicated satisfactory reliability (Table 3).

Questionnaire internal consistency:

Cronbach's α for functional and body image domains were 0.84 and 0.88, respectively. Cronbach's α of 0.84 for the functional domain indicates that the combined scores for that domain (items Q1-Q4), represents the correct scores in 84% of cases, which further indicates some degree of internal consistency between those four items (Table 4). As for the DASS21 subscales of depression, anxiety and stress, the Cronbach's α were 0.95, 0.81 and 0.88 respectively. All scores indicate satisfactory reliability (as Cronbach's α >0.7).

Testing questionnaire clarity:

The pilot test analysis concluded that the items of the questionnaire are clear and easy to understand (>90% of respondents). The answer scale options were also adequate and representative. However, some minor typographical revisions were implemented.

Discussion:

Psychometric properties of the questionnaire:

Face and content validation indicated that the questionnaire was an appropriate tool to measure the impact of tooth loss and the related psychological morbidities. Reliability analysis showed that each of the two subscales (functional & emotional) was internally reliable, i.e. items explored related questions, and the scores on each subscale were also related to the tooth loss impact construct. The DASS-21 also showed similar results. Finally, testing the theoretical hypothesis structure of the impact of tooth loss has also enhanced the construct validity of the questionnaire. Therefore, the validation process indicated that the questionnaire has satisfactory reliability and validity to measure the impact of tooth loss and related psychological health.

Body image construct:

The development process of this questionnaire indicated that functional difficulties and body image were the main concepts related to tooth loss. Therefore, studying the psychological impact of tooth loss is more meaningful when assessed in relation to those two concepts, as some individuals misattribute negative emotions to a specific source when in fact it is caused by another source.[25]

Body image is defined as "*internalised view of one's appearance that drives behaviour and influences information processing"*.[26] The dissatisfaction with the self-image that is related to tooth loss fulfils the definition of body image impairment described by Altabe and Thompson,[26] as this self-image impairment could influence individual's behaviours, social interaction and

relationships. Therefore, the concept of body-image should be included in the proposed questionnaire. The subscale of this concept should include items which relate to "*perception*" and "*attitude"*.[27] "*Perception*" relates to how the individual picture the image of their mouth/face in their own mind, and the "*attitude*", is how this perceived self-image affects their interaction with their surroundings.[27]

Body image and psychosocial concept:

The psychosocial and body image are closely related but different concepts. While the former illustrates the social and psychological aspects of tooth loss, the later represent the main trigger that provokes those disturbances. This relation was described in participants' feedback through the processes of developing this questionnaire. In addition, similar impacts on perception and behaviours were suggested by researches who studied the "global body image" construct.[27] Therefore, the possible dissatisfaction of body image after tooth loss/replacement with dentures may influence social interaction, feelings, emotions, and relationships. Based on that, the psychosocial concept was regarded as part of the body image domain and was assessed as part of the body image domain.

Interpretability of the proposed questionnaire:

Interpretability is defined as "*clarity and simplicity in understanding a measure quantitative scores".*[9] To interpret the results of a tool, systematic rules should be constructed to convert the subjective measured constructs into numerical grades.[20] This is carried out by developing a scoring system for the questionnaire to help measure difficult-to-measure psychosocial constructs

similar to the constructs in this study. To develop a scoring system for the Part A questionnaire, response items could be assigned numeric values; however, it should be noted that the intervals between items are not equal, i.e. the interval between “often” and “Very often”, is not the same as between “Never” and “rarely”. Furthermore, the weight of items are also not equal, i.e. a patient who score “4” on the “*problem with speaking” item* could have much more (or lower) impact than the score “4” on the “*problems with eating*” item. This problem could be potentially solved by adding weight to responses and items, but this process is quite difficult in this study as the studied sample is not homogenous, and therefore, it will be difficult to measure the difference between intervals and responses. Furthermore, weighting questionnaire items are less desirable, as they increase the complexity of using the measure and interpreting the data and they only slightly improve the questionnaire validity. Many authors questioned the advantage of adding weight to items.[28, 29]

Another method to interpret the results and compare responsiveness is to use aggregates scores or calculate the mean changes; however, there have been doubts about the meaning or the clinical relevance to such figures.[30,31] Therefore, it was decided to interpret the data on ordinal (not aggregates scoring) method with scaled hierarchical grades of the frequency on each item. The outcome measure of functional difficulties or body image satisfaction/dissatisfaction would be based on the maximum weight of every item in each of the two domains at a specific threshold. With higher frequency representing a higher degree of functional problems or body image dissatisfaction, i.e. if a participant has a frequency score ≥3 on any of the

functional difficulties' items, then this represents some degree of functional difficulties.

Differences between the developed questionnaire and OHRQoL tools:

It should be noted that although the OHIP and the developed questionnaire were correlated; that does not mean that these questionnaires measure the same domains. The OHIP measures the OHRQoL, which includes a domain for the psychosocial disturbance. However, the OHIP fails to measure psychological morbidity, i.e. depression, anxiety or distress. Psychological morbidities are measured by generic questionnaires, i.e. DASS-21. Therefore, a disease-specific measure (like the questionnaire that was developed in this study) would be suggested to be used to measure psychological morbidities associated with tooth loss/dentures.

The validated questionnaire has several limitations. Firstly, the small number of items (9 items) used to capture the domains in Part A was one of the limitations. However, it was intentional to produce a short questionnaire, to reduce the burden on participants, decrease response fatigue and increase the number of participants who are willing to join the study.[24] Nevertheless, reducing Part A of the questionnaire to nine items might mean that some functional or psychological difficulties which are applicable to a small number of patients may not be recorded and missed. Regardless of that, the main construct is still measured by the other items in the questionnaire; i.e. if a patient has problems with denture stability, this could be measured with a direct question specifically asking about denture stability; however, if this question is missing, it does not

mean that the impact of denture stability on the respondent has been missed. This functional problem could still be identified indirectly by an item that is asking about “trouble eating” or “discomfort”. Therefore, the validity of the scale is still satisfactory as long as each subscale have items that represent all the problems.

Secondly, only relatively small numbers of participants have been used to develop and validate this questionnaire. Nevertheless, those numbers were in line with the recommendations set by researchers.[9,18,12] Furthermore, questionnaire validation is not static, but an ongoing process, and further analysis of the data in the recruitment phase could be used to enhance the validity of the questionnaire.[12]

Thirdly, the sample for the development and validation has been recruited only from two primary dental practices. This calls into question the transferability and generalisability of the tool and raises the issue if this sample was representative of the general population. Further validation will be needed to assess whether this tool is suitable for other populations like secondary care patients.

The final limitation could be a possible selection bias caused by the inadequacy in the study design, i.e. the exclusion criteria had participants with active disease (dental caries, periodontal disease); however, it should be noted that participants have not been screened for extensive tooth surface loss. This

dental disease could also be a possible cause for distress, and ideally, those participants should have been excluded in the study design.

It should be noted that this developed questionnaire is not a diagnostic measure, but a screening tool, which could be used in the general dental practice to investigate the possible psychological impact of tooth loss/dentures. Patients who have tooth loss and/or were treated with dentures could be asked to complete the questionnaire. Subsequently, those who were identified with body image dissatisfaction and/or psychological disturbance could then be investigated by the general dental practitioner to assess if any further interventions might help to support these individuals.

In addition, this developed questionnaire also offers the opportunity to conduct future research by analysing the psychological impact of tooth loss, and comparing the effectiveness of different interventions such as removable/fixed prostheses. Therefore, the developed questionnaire could be used in a longitudinal comparative study to compare the psychological impact of tooth loss in patients who have different interventions, i.e. removable dentures, dental implants retained fixed restorations and/or cognitive behavioural therapy.

Conclusion:

A disease-specific measure was developed and validated. This validated questionnaire could assess the impact of tooth loss (functional difficulties, self-

body image), screen for psychological morbidities and assess the effectiveness of intervention, i.e. dentures.

Table 1: Face and content validation results

F: Face validation, C: Content Validation,			
Item	Revision / Changes	Justification	Validation
Part A Part B	**Layout**: Swap Part A & Part B	Start with simple / recognizable items	F, C
Part A	**Clarity**: Highlight the introduction: "circle your answer"	Simplify how to complete the questionnaire	F
DT Part A	**Layout**: Responses in DT options changed to similar spacing	Avoid drawing respondents' eyes to certain options over others	C
DT Part A	**Clarity**: Clarify how to answer: "circle your answer"	Simplify how to complete the questionnaire	F
DT Part A	**Construct clarity**: Remove double-barreled item	Improve validity	C
Part B items	**Construct clarity**: Remove double-barreled item	Improve validity	~~C, F~~
Part B	**Clarity**: Change "self- conscious about your tooth loss" to "Have you been uncomfortable because of the impact of tooth loss on your appearance"	Body image construct	F, C
Part B	**Clarity**: Remove "have you been occupied" Do you think a lot about your tooth loss?	Use simple language vocabulary	F, C
Part B	**Clarity**: Remove "activities", "situations" and "socializing" and replace with "Do you avoid social situations because of your tooth loss? "	Avoid multiple questions	C
Part B	**Clarity**: Remove "trouble in relationship" and replace with "stress in your relationship" Have you had stress in your relationship/marriage because of your tooth loss?	Use simple language vocabulary	F, C
Part B	Change "dichotomous response scale" to "Likert response scale"	-Help quantify and analyse data -Expand patient's choices	F, C

Table 2: Pearson's correlation coefficients between OHIP-14 & proposed questionnaire

Part A	OHIP-14 domains	(r)	DT (r)
Functional Difficulties	Functional limitation	0.743	0.756
	Physical pain	0.700	
	Physical disability	0.819	
Body image	Psychological discomfort	0.710	0.808
	Psychological disability	0.732	
	Social disability	0.478	

(n=20), All correlations significant at 0.01

Table 3: Test re-test reliability

			Correlation coefficients (For each Items)		Correlation coefficients (For Domains)	
Part A	Domains		ICC	Pearson	ICC	Pearson
	Functional Health	Q1	0.793	0.787*	0.86	0.93*
		Q2	0.762	0.893*		
		Q3	0.782	0.815*		
		Q4	0.701	0.724*		
	Body image	Q5	0.705	0.830*	0.79	0.94*
		Q6	0.705	0.770*		
		Q7	07.16	0.754*		
		Q8	0.765	0.800*		
		Q9	0.759	0.861*		
DASS 21	Depression				0.874	0.917*
	Anxiety				0.849	0.893*
	Stress				0.820	0.893*
DT			0.757	0.798*		

* Correlation is significant at 0.01

Table 4: Reliability coefficient for each subscale (n=20)

Questionnaire parts and domains		No of items	Cronbach's α Coefficient (n=20)
Part A	Functional domain	4	0.846
	Body image domain	5	0.883
DASS21	Depression	7	0.953
	Anxiety	7	0.818
	Stress	7	0.886

Supplement 1: The developed questionnaire

Part A:

Please circle how often have you had any of the following during the last year?

1	Have you had trouble speaking because of your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know
2	Have you had trouble eating because of your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know
3	Have you had to change your diet because of your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know
4	Have you had discomfort / pain because of your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know
5	Have you been uncomfortable because of the impact of tooth loss on your appearance?	Very often	Often	Sometimes	Rarely	Never	Don't know
6	Do you think a lot about your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know
7	Do you avoid social situations because of your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know
8	Have you had stress in your relationship / marriage because of your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know
9	Have you found it difficult to relax because of your tooth loss?	Very often	Often	Sometimes	Rarely	Never	Don't know

Part B:

Please read each statement and circle a number 0, 1, 2 or 3, which indicates how much the statement applied to you **over the past week**. The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree or a good part of time
3 Applied to me very much or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (e.g. in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

How would you rate the impact of tooth loss on your life? (Circle your answer)

0	1	2	3	4	5	6	7	8	9	10
No distress					Mildly distress					Severe distress

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